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MILLER IP GROUP, PLC
GENERAL MOTORS CORPORATION
42690 WOODWARD AVENUE
SUITE 200
BLOOMFIELD HILLS, MI 48304

EXAMINER	
CHUO, TONY SHENG HSIANG	

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/765,815
Filing Date: January 27, 2004
Appellant(s): POSPICHAL ET AL.

John A. Miller
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2/19/08 appealing from the Office action mailed 9/26/07.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

JP 60-160574	MITANI et al	8-1985
2002/0039672	ARAMAKI	4-2002
2002/0150805	STENERSEN et al	10-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Mitani et al (JP 60-160574). The Mitani reference discloses a method of preventing a surge condition of a compressor in a fuel cell system comprising: storing a compressor map of the compressor; driving the compressor at a desirable speed; and using the compressor map to determine the location on the compressor map that the compressor is operating and prevent effectively the generation of surging (See Abstract and Drawings 1 and 2). It also discloses that the air flow quantity and rotary speed of the turbo compressor are input signals (See page 8, lines 13 and 14 of translation). Examiner's note: Since the air flow rate and the speed are known parameters, the compressor map can be used to determine the discharge pressure and the temperature of the compressor.

Claims 1, 2, 4-6, 13, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aramaki (US 2002/0039672) in view of Mitani et al (JP 60-160574).

The Aramaki reference discloses a fuel cell system comprising: a fuel cell "1" including a cathode input responsive to a charge airflow and a cathode exhaust; a compressor "2" generating airflow applied to the cathode input of the fuel cell; an air flow meter "4" responsive to the airflow sent to the compressor and generating a signal indicative of the speed of the airflow through the compressor; a motor "15" for driving the compressor; a controller "20" responsive to the signal from the air flow meter to provide a signal to the motor to control the speed of the compressor; and a back

pressure valve “14” positioned in the cathode exhaust that controls the pressure in the fuel cell, wherein the controller controls the orientation of the back pressure valve (See paragraphs [0018],[0019],[0025] and Figure 1). It also discloses a fuel cell system for use in an automotive field (See paragraph [0003]).

However, Aramaki does not expressly teach a by-pass valve in the cathode exhaust and a controller that stores a compressor map of the compressor, determines the discharge pressure and temperature of the compressor from the speed of the controller and the airflow signal from the mass flow meter, determines the location on the compressor map at which the system is operating, and prevents the compressor from entering a surge condition; or a compressor that is a turbo-machine compressor. The Mitani reference discloses a turbo-compressor system for fuel cell power generation and a method of operating the fuel cell system comprising: determining whether the operating condition of the compressor comes in the area A of the compressor map where surging takes place; and controlling the flow rate regulating valve “18” (by-pass valve) to return the operating condition of the compressor to the regular operation area B, thereby preventing the generation of surging. Examiner’s note: It is inherent that the Aramaki controller is capable of controlling the back pressure valve to prevent the surge condition.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Aramaki fuel cell system to include a by-pass valve in the cathode exhaust and a controller that stores a compressor map of the compressor, determines the discharge pressure and temperature of the compressor

from the speed of the controller and the airflow signal from the mass flow meter, determines the location on the compressor map at which the system is operating, and prevents the compressor from entering a surge condition in order to control the flow rate for air supply to a compressor over a wide range without causing any problems such as surging.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aramaki (US 2002/0039672) in view of Mitani et al (JP 60-160574) as applied to claims 1 and 2 above, and further in view of Stenersen et al (US 2002/0150805).

However, Aramaki as modified by Mitani et al does not expressly teach a compressor that is selected from the group consisting of centrifugal, radial, axial, and mixed flow compressors. The Stenersen discloses compressors commonly used in conjunction with fuel cells that include centrifugal compressors and axial compressors (See paragraph [0139]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Aramaki/Mitani fuel cell system to include a compressor that is selected from the group consisting of centrifugal and axial compressors in order to utilize a compressor that is compatible for use in fuel cell systems for supplying air to the fuel cell.

(10) Response to Argument

The appellant argues that nothing in Mitani would teach or suggest to one of ordinary skill in the art that the Mitani system uses any type of input signal, such as airflow rate, compressor speed, discharge pressure, etc. to determine the location on a

compressor map that the compressor is currently operating. Firstly, the appellant admits that the relationship of discharge pressure and mass airflow for a compressor shown in figure 1 in appellant's specification and in figure 1 in Mitani is a relationship that is well known and understood to those skilled in the art. Secondly, the appellant further admits that that Mitani is using this relationship in their figure 1 to show when the compressor is in a surge condition and when it is not. The examiner disagrees with the assertion by the appellant that the Mitani system does not use any type of input signal, such as airflow rate, compressor speed, discharge pressure, etc. to determine the location on a compressor map that the compressor is currently operating. Lines 11-14 of page 8 of the translation of Mitani et al states that the flow regulating valve 18 is operated using the air flow quantity flowing through the air supply path 15 and the rotary speed of the turbo compressor as input signals. Since Mitani et al clearly teaches air flow quantity and rotary speed of the compressor as known input signals, one skilled in the art would definitely be able to determine where on the compressor map the compressor is operating and then using this determination to decide whether to take steps to prevent compressor surge. As shown in Figure 1 of Mitani et al, the air flow quantity "b" and rotary speed "c" of the compressor are known variable that are used to determine whether the compressor is approaching a surge condition which is area “A”.

The appellant further argues that Mitani does not teach or suggest storing a compressor map to determine the operating condition of a compressor in a fuel cell system and using this information to prevent the compressor from entering a surge condition. The examiner disagrees. It is contended by the examiner that the main

reason to disclose a compressor map is to use the map to determine the location on the compressor map that the compressor is operating. In addition, Mitani et al states that "the air quantity supplied to the compressor is flexibly controlled in a wide range while maintaining the pressure of the compressed air injected from said compressor, problems, such as surging, do not occur" (See page 10 line 22 to page 11 line 1). Therefore, as stated in Mitani et al, the effectiveness of this invention is to prevent problems such as surging from occurring. Further, there is no reason why the compressor map disclosed by Mitani et al cannot be used to prevent a surge condition since the purpose of the compressor map is to determine whether the compressor is approaching a surge condition. In addition, it is well known in the art that fuel cell systems are controlled by controllers or control units. Therefore, one skilled in the art would know that a compressor map can be stored in the controller in order to utilize it to prevent a surge condition based on the teachings of Mitani et al.

The appellant further argues that Aramaki does not teach, suggest, disclose, or mention any technique or method of preventing compressor surge of the compressor. The Aramaki reference is relied upon for the teaching of a fuel cell system comprising: a fuel cell, a compressor, an air flow meter, a motor for driving the compressor, a controller responsive to the signal from the air flow meter to provide a signal to the motor to control the speed of the compressor, and a back pressure valve. Therefore, Aramaki is not require to teach a method of preventing compressor surge. As discussed above, the Mitani reference does teach a method of preventing compressor surge.

The appellant also argues that Mitani does not teach determining the discharge pressure and temperature of the compressor from the speed of the compressor and the airflow from a mass flow meter. As discussed above, the compressor map disclosed by Mitani et al can be used to determine the discharge pressure by using the known input signals of rotation speed and air flow quantity to locate on the map and determine the discharge pressure on the y-axis of the graph. In addition, it is well known in the art that temperature sensors are located in fuel cell systems. Therefore, the temperature of the airflow from the discharge of the compressor can easily be measured as the inlet temperature of the air entering the cathode of the fuel cell.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Tony Chuo/

Examiner, Art Unit 1795

Conferees:

Patrick Ryan

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795

William Krynski

/William Krynski/

Quality Assurance Specialist, TC 1700